Northern Basket Starfish *Gorgonocephalus arcticus*

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: Brittle Stars *Ophiuroidea*
Order: Basket Stars *Euryalida*
Family: Basket Stars *Gorgonocephalidae*

General comments: none

SGCN Priority Ranking - Designation Criteria:

Risk of Extirpation: NA

State Special Concern or NMFS Species of Concern: NA

Recent Significant Declines:

Northern Basket Starfish is currently undergoing steep population declines, which has already led to, or if unchecked is likely to lead to, local extinction and/or range contraction.
Notes:
recent decline - Trott, in review; Applehans et all 2012; last record in Cobscook Bay 1975; climate change - Arctic Province species; subjected to targeted collections for public aquaria display; understudied as dredge by-catch, professional judgemen

Regional Endemic: NA

High Regional Conservation Priority: NA

High Climate Change Vulnerability:

Gorgonocephalus arcticus is highly vulnerable to climate change.

Understudied rare taxa:

Recently documented or poorly surveyed rare species for which risk of extirpation is potentially high (e.g. few known occurrences) but insufficient data exist to conclusively assess distribution and status. *criteria only qualifies for Priority 3 level SGCN*
Notes:
recent decline - Trott, in review; Applehans et all 2012; last record in Cobscook Bay 1975; climate change - Arctic Province species; subjected to targeted collections for public aquaria display; understudied as dredge by-catch, professional judgemen

Historical: NA

Habitats Associated with Northern Basket Starfish:

Formation Name

Macrogroup Name **Intertidal Bedrock**

Habitat System Name: Low-Intertidal ****Primary Habitat****

Notes: *assumed spawning habitat, assumed juvenile feeding habitat; cling to adults which may provide nutrition, juvenile and adult, feeding habitat*

Macrogroup Name **Intertidal Gravel Shore**

Habitat System Name: Lower Intertidal ****Primary Habitat****

Notes: *assumed spawning habitat, assumed juvenile feeding habitat; cling to adults which may provide nutrition, juvenile and adult, feeding habitat*

Formation Name **Subtidal**

Macrogroup Name **Subtidal Bedrock Bottom**

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Habitat System Name: Bedrock ****Primary Habitat****
Notes: *assumed spawning habitat, assumed juvenile feeding habitat; cling to adults which may provide nutrition, adult feeding habitat, over-wintering habitat*

Habitat System Name: Erect Epifauna ****Primary Habitat****
Notes: *assumed spawning habitat, assumed juvenile feeding habitat; cling to adults which may provide nutrition adult feeding habitat, over-wintering habitat, assumed larval development inside Gersemia polyps*

Macrogroup Name **Subtidal Coarse Gravel Bottom**

Habitat System Name: Coarse Gravel ****Primary Habitat****
Notes: *assumed spawning habitat, assumed juvenile feeding habitat; cling to adults which may provide nutrition, adult feeding habitat, over-wintering habitat*

Habitat System Name: Erect Epifauna ****Primary Habitat****
Notes: *assumed spawning habitat, assumed juvenile feeding habitat; cling to adults which may provide nutrition, adult feeding habitat, over-wintering habitat, assumed larval development inside Gersemia polyps*

Stressors Associated with Northern Basket Starfish:

IUCN Level 1 Threat **Biological Resource Use**

IUCN Level 2 Threat: Fishing and Harvesting of Aquatic Resources
Severity: Moderate Severity **Actionability:** Moderately actionable
Notes: Large-scale, unintentional by-catch of commercial bottom trawling reduces population size and subsequently results in decreased benthic diversity and functional group "suspension feeders" and impaired commensal associations with soft corals. Likelihood is high (high certainty) and large-scale (throughout the region where this species occurs), so actionability is low, but moderate in new areas for developing bottom trawl fisheries. Intentional collection by aquarium trade leads to significant population reductions with similar effects. Likelihood is high (high certainty) and small-scale so actionability is high.

IUCN Level 1 Threat **Climate Change and Severe Weather**

IUCN Level 2 Threat: Habitat Shifting or Alteration
Severity: Severe **Actionability:** Actionable with difficulty
Notes: Ocean acidification results in decreased suvivorship of larvae, and growth and feeding by adult sea stars. Likelyhood is high and large scale. The ability to mitigate ocean acidificationis low.

IUCN Level 2 Threat: Temperature Extremes
Severity: Severe **Actionability:** Actionable with difficulty
Notes: Northern Basket Stars are cold-water species. Increased water temperatures have interactive effects with ocean pH decreasing survivorship of larvae and growth rate of sea stars. Likelihood is high (high certainty) and large scale (through the region where this species occurs). The ability to mitigate sea temperature change is low.

IUCN Level 1 Threat **Invasive and Other Problematic Species, Genes and Diseases**

IUCN Level 2 Threat: Invasive Non-native/Alien Species/Diseases
Severity: Moderate Severity **Actionability:** Actionable with difficulty
Notes: Invasives such as encrusting colonial tunicates (*Didemnum vexillum*) could decrease availability of habitat and have other effects largely unknown at this time. Likelihood is high and large scale (throughout the region), so actionability is low.

IUCN Level 1 Threat **Pollution**

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IUCN Level 2 Threat: Agricultural and Forestry Effluents

Severity: Severe **Actionability:** Moderately actionable

Notes: Echinoderm larvae are exceptionally sensitive to excessive nutrients, toxic chemicals (including heavy metals, and pesticides), and/or sediments orginating from agriculture and the aquaculture activity. Adults are sensitive, but less so. Likelihood is high and increasing (high certainty). Current spatial extent is most severe in Southern Maine, but expanding along coast along with development of the aquaculture industry , so actionability is moderate, i.e. the threat can be minimized in newly developing areas expanding into the geospatial range of this species.

IUCN Level 2 Threat: Domestic and Urban Waste Water

Severity: Severe **Actionability:** Moderately actionable

Notes: Echinoderm larvae are exceptionally sensitive to excessive nutrients, toxic chemicals (including heavy metals, and pesticides), and/or sediments orginating from water-borne sewerage and non-point run-off from housing and urban areas. Liklihood is high and increasing (high certainty), current spatial extent is most severe in Southern Maine, but expanding along coast, so actionability is moderate, i.e. the threat can be minimized in newly developing areas expanding into the geospatial range of this species.

IUCN Level 2 Threat: Industrial and Military Effluents

Severity: Severe **Actionability:** Moderately actionable

Notes: Oil spills are toxic to species with intertidal distributions. Local scale spills have an unpredictable likelihood and actionability is moderate and influenced by response time to spills.

Species Conservation Range Maps for Northern Basket Starfish: